AMENDMENTS TO THE CLAIMS

1-34. (Cancelled)

35. (Previously Presented) A method for controlling the line of sight of a camera to remain fixed on a target, the camera being on an aircraft whose current position is moving at a velocity relative to a current position of the target, the method comprising:

setting an initial line of sight for the camera that is aimed at the current position of the target;

calculating a transformation matrix C_{CE} for transforming from the earth reference frame to the camera reference frame;

periodically determining a static adjustment including,

calculating a position vector ΔR^E between the aircraft and the target in the earth reference frame as: $\Delta R^E = R^E_{target} - R^E_{aircraft}$, wherein R^E_{target} represents the current position of the target and $R^E_{aircraft}$ represents the current position of the aircraft,

calculating a position vector ΔR^C between the aircraft and the target in the camera reference frame by transforming the position vector ΔR^E to the camera reference frame as $\Delta R^C = C_{CE}\, \Delta R^E$,

calculating a normalized position vector $\Delta\tilde{R}^C$ as $\Delta\tilde{R}^C = \frac{\Delta R^C}{|\Delta R^C|}$, wherein the normalized position vector indicates the difference between the actual line of sight of the camera and the line of sight needed to point to the target in the scan and tilt directions, and

setting the line of sight of the camera based at least in part on the normalized position vector $\Delta\tilde{R}^C$;

periodically determining a dynamic adjustment including,

calculating a velocity vector ΔV^E between the aircraft and the target in the earth reference frame as: $\Delta V^E = V^E_{target} - V^E_{aircraft}$, wherein V^E_{target} represents the current velocity of the target and $V^E_{aircraft}$ represents the current velocity of the aircraft,

calculating a velocity vector ΔV^C between the aircraft and the target in the camera reference frame by transforming the velocity vector ΔV^E to the camera reference frame as $\Delta V^C = C_{CE}\, \Delta V^E$,

calculating a normalized velocity vector $\Delta \tilde{V}^C$ as $\Delta \tilde{V}^C = \frac{\Delta V^C}{|\Delta R^C|}$, wherein the normalized velocity vector indicates the angular velocity that the camera needs to move in the scan and tilt directions to compensate for overflight velocity, and

setting an angular velocity for moving the line of sight of the camera based at least in part on the normalized velocity vector $\Delta \tilde{V}^C$;

maintaining the line of sight of the camera by combining the determined dynamic and static adjustments as the attitude of the aircraft changes relative to the current position of the target, including setting an adjustment A for the camera wherein $A = \Delta \tilde{R}^C * W + \Delta \tilde{V}^C$ and wherein W represents a weighting factor based at least in part on the accuracy of the measurements used to calculate the dynamic and static adjustments.

36. (Cancelled)

37. (Previously Presented) The method of claim 35 wherein the initial line of sight of the camera is set based on an operator centering the line of sight of the camera on the target.

38. (Previously Presented) The method of claim 35 wherein the initial line of sight of the camera is set based on the current position of the target and the current position and attitude of the vehicle.

39. (Previously Presented) The method of claim 35 wherein the vehicle is land based.

40. (Previously Presented) The method of claim 35 wherein the vehicle is airborne.

41. (Previously Presented) The method of claim 35 wherein the vehicle is space based.

42. (Previously Presented) The method of claim 35 wherein the target is at a fixed position.

43. (Previously Presented) The method of claim 35 wherein the target is moving.

44. (Previously Presented) The method of claim 35 including calculating an initial position of the target based on an initial position of the vehicle and an initial difference in altitude between the vehicle and the target.

45. (Previously Presented) The method of claim 35 including calculating the current position of the target based on the current position of the vehicle and altitude of the target.

46. (Previously Presented) The method of claim 35 including calculating the current position of the target based on the current position of the vehicle and difference in altitude between the current position of the vehicle and current position of the target.

47. (Previously Presented) The method of claim 35 wherein the attitude includes pitch, roll, and heading.

48. (Previously Presented) The method of claim 35 wherein a gyroscope is used to maintain the line of sight of the camera.

49. (Previously Presented) The method of claim 35 wherein combining the determined dynamic and static adjustments allows for smooth and continuous adjustments to be made based on velocity while correcting for accumulated errors in the line of sight.

50. (Currently Amended) A calibration system for controlling the orientation of a device to remain fixed on a target, the device being on a vehicle that is moving relative to a target, comprising:

a component that sets an initial line of sight for the camera that is aimed at the current position of the target;

a component that calculates a transformation matrix C_{CE} for transforming from the earth reference frame to the camera reference frame;

a component that periodically determines a static adjustment by,

calculating a position vector ΔR^E between the ~~aircraft~~ vehicle and the target in the earth reference frame as: $\Delta R^E = R^E_{target} - R^E_{aircraft}$, wherein R^E_{target} represents the current position of the target and $R^E_{aircraft}$ represents the current position of the~~ aircraft~~ vehicle,

calculating a position vector ΔR^C between the ~~aircraft~~ vehicle and the target in the camera reference frame by transforming the position vector ΔR^E to the camera reference frame as $\Delta R^C = C_{CE}\,\Delta R^E$,

calculating a normalized position vector $\Delta\tilde{R}^C$ as $\Delta\tilde{R}^C = \frac{\Delta R^C}{|\Delta R^C|}$, wherein the normalized position vector indicates the difference between the actual line of sight of the camera and the line of sight needed to point to the target in the scan and tilt directions, and

setting the line of sight of the camera based at least in part on the normalized position vector $\Delta\tilde{R}^C$;

a component that periodically determines a dynamic adjustment by,

calculating a velocity vector ΔV^E between the ~~aircraft~~ vehicle and the target in the earth reference frame as: $\Delta V^E = V^E_{target} - V^E_{aircraft}$, wherein V^E_{target} represents the current velocity of the target and $V^E_{aircraft}$ represents the current velocity of the ~~aircraft~~ vehicle,

calculating a velocity vector ΔV^C between the ~~aircraft~~ vehicle and the target in the camera reference frame by transforming the velocity vector ΔV^E to the camera reference frame as $\Delta V^C = C_{CE}\,\Delta V^E$,

calculating a normalized velocity vector $\Delta\tilde{V}^C$ as $\Delta\tilde{V}^C = \frac{\Delta V^C}{|\Delta R^C|}$, wherein the normalized velocity vector indicates the angular velocity that the camera needs to move in the scan and tilt directions to compensate for overflight velocity, and

setting an angular velocity for moving the line of sight of the camera based at least in part on the normalized velocity vector $\Delta\tilde{V}^C$; and

a component that maintains the line of sight of the camera by combining the determined dynamic and static adjustments as the attitude of the ~~aircraft~~

vehicle changes relative to the current position of the target, including setting an adjustment A for the camera wherein $A = \Delta\tilde{R}^{C} * W + \Delta\tilde{V}^{C}$ and wherein W represents a weighting factor based at least in part on the accuracy of the measurements used to calculate the dynamic and static adjustments.

51. (Previously Presented) The system of claim 50 wherein the initial line of sight of the camera is set based on an operator centering the line of sight of the camera on the target.

52. (Previously Presented) The system of claim 50 wherein the initial line of sight of the camera is set based on the current position of the target and the current position and attitude of the vehicle.

53. (Previously Presented) The system of claim 50 wherein the vehicle is land based.

54. (Previously Presented) The system of claim 50 wherein the vehicle is airborne.

55. (Previously Presented) The system of claim 50 wherein the vehicle is space based.

56. (Previously Presented) The system of claim 50 wherein the target is at a fixed position.

57. (Previously Presented) The system of claim 50 wherein the target is moving.

58. (Previously Presented) The system of claim 50 including calculating an initial position of the target based on an initial position of the vehicle and an initial difference in altitude between the vehicle and the target.

59. (Previously Presented) The system of claim 50 including calculating the current position of the target based on the current position of the vehicle and altitude of the target.

60. (Previously Presented) The system of claim 50 including calculating the current position of the target based on the current position of the vehicle and difference in altitude between the current position of the vehicle and current position of the target.

61. (Previously Presented) The system of claim 50 wherein the attitude includes pitch, roll, and heading.

62. (Previously Presented) The system of claim 50 wherein a gyroscope is used to maintain the line of sight of the camera.

63. (Previously Presented) The system of claim 50 wherein combining the determined dynamic and static adjustments allows for smooth and continuous adjustments to be made based on velocity while correcting for accumulated errors in the line of sight.